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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/842,315	04/26/2001	Taketomi Asami	0756-2306	5664

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02/13/2003

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EXAMINER

BLUM, DAVID S

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 02/13/2003

18

Please find below and/or attached an Office communication concerning this application or proceeding.

5/92 Amended
5/27 Sup Amendment

Office Action Summary

Application No.

09/842,315

Applicant(s)

ASAMI ET AL.

Examiner

David S Blum

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

This action is in response to RCE paper #17, filed 1/6/03.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 7, 9, 11, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teramoto (US 5,773,325) in view of Varhue (US 6,313,017) and Wasserman (US006221766B1).

Teramoto teaches all of the positive steps of claims 1-5, 7, 9, 11, and 13-14 except for in-situ cleaning of the semiconductor film and etch cleaning while spinning the substrate. Teramoto teaches forming an amorphous silicon film (304) on a base film, the amorphous film is recrystallized and patterned (thus forming an island shape), and forming a gate insulating film (305) on the crystalline film.

Varhue teaches that silicon films and substrates must be cleaned of contamination impurities (cleaning or removing material is etching) and does this in an acid containing fluorine (as in claims 13 and 14) and preferably (in-situ) in a load-lock chamber which will avoid exposure to the (clean room air) atmosphere and allow the next layer to be

Art Unit: 2813

formed (column 5 lines 10-25). Varhue also teaches that if the film is exposed to oxygen atmosphere, it must be recleaned (in-situ) prior to forming the next layer.

Wasserman teaches etching equipment for removing unwanted particles includes a rotatable support for spinning the substrate under a supply of etching solution (column 2 lines 5-10), thus applying an etching solution while spinning the substrate. This method will increase throughput and reduces particulate contamination (column 2 lines 16-20).

Varhue does not recite which impurities are removed in their cleaning processes. The applicant, on page 2, first paragraph of the summary of the invention, states that semiconductor devices are usually produced in clean rooms, but that filters generate impurities (particularly boron) as part of operation (as in claims 13 and 14). Therefore it is inherent to semiconductor fabrication that boron is one of the impurity contaminants on a substrate. Further, the applicant states that if a human being is in the clean room (conventional practice), sodium will be a common impurity contaminant (as in claims 13 and 14). As Varhue teaches cleaning the substrate by the same process as the applicant, and boron and sodium are intrinsically contaminate the substrate, it is obvious that the same chemicals would remove these impurities from the substrate in Varhue as in the instant application (claims 13-14).

It would be obvious to one skilled in the requisite art at the time of the invention to modify Teramoto by including cleaning the film surface as suggested by Varhue (to be a

Art Unit: 2813

standard semiconductor procedure) and to include etching/cleaning the substrate by a spin method to increase throughput (Wasserman) to produce a device without unwanted impurities (Teramoto column 4 lines 19-21, Varhue column 5 lines 10-12, Wasserman column 2 lines 16-20).

3. Claims 6, 8, 10, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teramoto (US 5,773,325) in view of Varhue (US 6,313,017) and Wasserman (US006221766B1) as applied to claims 1- 4, above, and further in view of Lampert (US005181985A).

Teramoto, Varhue, and Wasserman teach all of the positive steps of claims 6, 8, 10, 12, and 15 as recited above, except for rinsing surfaces with pure water containing ozone.

Lampert teaches this step. Lampert rinses wafer surfaces with pure water containing ozone (column 2 line 56). Lampert teaches impurities must be removed to improve CVD oxidation, epi and polysilicon deposition.

It would be obvious to one skilled in the requisite art at the time of the invention to modify the surface by rinsing with ozone/water as known in the art and suggested by Lampert (to be a standard semiconductor procedure) with reasonable expectation of producing device without unwanted impurities (Teramoto column 4 lines 19-21, Varhue column 5 lines 10-12, Wasserman column 2 lines 16-20, Lampert Background).

Response to Arguments

4. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

The examiner notes that most of the amendments consist of limiting the process to applying the etchant while spinning the wafer. Wasserman teaches this process.

Regarding the amendment of not exposing the substrate to air (rather than an atmosphere), the amendment has caused the removal of the 112 rejection, but does not avoid the prior art.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Meikle US006426288B1 teaches etching by spin etching

Verhaverbeke US 20020063169A1 teaches wet etching and cleaning of wafers is done by immersing the wafers into a liquid (paragraph 0005). Verhaverbeke also teaches that for fast single wafer processing, the liquid can be sprayed on a wafer while the wafer is spinning (paragraph 0006). Verhaverbeke teaches this method has increased throughput. Verhaverbeke then teaches an improved method for spin etching/cleaning wafers (paragraphs 0007 and 0018).

Art Unit: 2813

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (703)-306-9168 and e-mail address is David.blum@USPTO.gov.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr., can be reached at (703)-308-4940. Our facsimile number for Before-Final Communications is (703)- 872-9318 and for After-Final Communications is (703)- 872-9319. The facsimile number for customer service is (703)-872-9317. Our receptionist's number is (703)-308-0956.



David S. Blum

February 4, 2003